ARTICULATED RAILCARS

This application claims the benefit of U. S. Provisional Application No. 60-220,182 filed on 7/24/2000.

Field of the Invention

This application relates to coupling railcars and more particularly to coupling individual railcars into a fully articulated train in the railyard.

Background of the Invention

The M10,000 was probably the first articulated train. It is known that "articulating" makes the French TGV passenger train capable of its speed due to the fact that trucks are the heaviest part of a railcar and removing one-half the trucks removes one-half the dead weight. But articulating trains, especially using the French method, is extremely complicated and one problem with one car will necessitate taking the whole train out of service. TTX Co. today in America makes articulated flat cars that, as do all prior art articulation schemes, require the cars to be coupled nearly permanently in packs. The only way to remove or add a car is to take the whole train or "pack" into the shop and take it apart using heavy equipment.

Thus as it stands today, if one problem, such as a flat wheel, occurs a whole capital investment, the entire car, or worse, the entire articulated train itself or pack of cars, must be taken out of service to fix it. Placing an entire 10-pack of fullv-loaded articulated railcars on a siding just because of one hot bearing is an extreme, but necessary endangerment of freight while at the same time it takes such a large number of cars out of service. There must be a simple, cost-effective way to increase the paying freight capacity of a train, lengthen the service time of the capital investments and still maintain standard railcar yard operations not requiring complete retraining of railyard personnel. Though this is a tall order, it will be seen that the instant invention can indeed perform this function.

The instant articulating bogies only go into the shop for scheduled maintenance, flat wheels and the like. The railcars themselves stay on the rails

performing their function and speeding freight or passengers. The instant railcar-articulating device is designed for retrofitting existing cars as well as being designed into, for and to be placed upon new cars.

"Landing gear" for the wheelless railcars is designed to allow those cars to stand alone and even go over the railyard hump without attached bogies. Of course, the "landing gear" may simply be provided with a replaceable Teflon pad at the bottom [having a flange of course] that serves to allow it to slide easily over short distances. In another form, the cars can be fully articulated before being sent over the hump.

It is known that large buildings can be made "earthquake proof" by resting them on bearings. Contrary to prior art attempts to place the trucks between cars, the instant method of articulating uses a horizontal bearing or race of bearings upon which to rest the weight of the railcars. The bearing is then carried by standard-type railcar trucks.

The instant invention carries with it all necessary hoses and connections similar to that of the existing Road Railer device for placing over-the-road truck trailers upon the rails in a train.

The instant device is designed to allow the railroads to make up a 'pack' of articulated railcars in the yard as needed and to change the number of cars in that 'pack' on a moment's notice without needing to take them into the shop.

The point is, by using this invention, railroads have complete freedom in articulating trains with new and retrofitted cars, converting present deadweight into paying use and transferring individually articulated cars from railroad to railroad. The prior art cannot perform this function.

Thus, the instant invention is capable of being designed for all operating situations and can allow the railroads choice, retrofitting and ease of use in the railyard under most if not all conditions. Shippers can show a bottom-line decrease in initial capital costs. Manufacturers can profit from building new cars and retrofitting old cars from all railroads worldwide.

Summary of the Invention

A system for articulating trains that is both simple to do and can still allow standard railyard operations by all the railroads worldwide is disclosed. The system is perfectly adaptable to retrofitting existing rolling stock at low cost, as it is to new design.

It is an object of the instant invention to provide means and method for articulating parts of and up to whole trains in the railyard.

Brief Description of the Drawing

The figures of the drawing are all presented in semi-schematic form.

Fig. 1 is a side view of two railcars made after the manner of the instant invention with one car having the instant articulating device permanently attached thereto while the other car does not.

Fig. 2 is a bottom view of the two railcars and device of Fig. 1.

Fig. 3 is a bottom view of a railcar showing the important support plate and the standard hosing needed to make up a viable train.

Fig. 4 is a side view of a car having an extended landing gear.

Fig. 5 is a side view of a car having a retracted landing gear.

Fig. 6 is a bottom view of two cars having the invention's device mounting structure therebetween.

Fig. 7 is a side view of a car landing gear having a pad placed thereupon.

Fig. 8 is a side view of three cars, with one shown from the bottom, having an instant device placed therebetween.

Fig. 9 is a side view of the instant device in its most compact form.

Fig. 10 is a side view of half of the device of Fig. 9 but having wheels put upon the axle.

Fig. 11 is a side view of a car having an extended support plate and making ready to be supported by the compact version of the instant device.

Fig. 12 is a side view showing the car of Fig. 11 supported by the instant device.

Fig. 13 is a side view of the instant device having a split stand upon which are mounted coupling mechanisms.

Fig. 14 is a side view of the instant device having a stand and coupling mechanisms placed to one side of the device itself.

Fig. 15 is a side view showing two railcars coupled in fully articulated fashion by the instant device.

Fig. 16 is a side view of a car having an extended, curved support plate.

Fig. 17 is a side view of two cars, one having an extended plate and preparing to couple with the instant device which is also preparing to couple to a standard railcar.

Fig. 18 is a side view of an instant device having a minimum of material, using high-strength, lightweight composite materials and capable of being loaded in tension.

Fig. 19 is a side view close-up schematic detail of a bearing, support plate and mounting mechanism.

Fig. 20 is a side view of a composite axle having a metal wheel and heat dissipating flanges on the wheel.

Fig. 21 is a front view of a mounting mechanism having mounting extensions reaching up to a high sidewall mounted support plate.

Description of the Preferred Embodiment

All railcars are already mounted on roller bearings. Thus it is easy to understand that a different type of mount is practical, i.e.: a horizontal bearing mount! This is a type of "lazy-susan bearing" placed upon a set of trucks separable from the railcars themselves. And that this novel way of mounting railcars on railroad trucks can, indeed, realistically save the weight of an entire railroad truck per car.

With the understanding that railroad cars can be supported by horizontally mounted bearings, you no longer need trucks for every car. And the bogie can be moved between cars and separably support them both at the same time using the horizontal bearings. This is the instant basis for articulating an entire train in the railyard. This teaching is not in the prior art.

Vertically mounted bearings can also be used.

The air hoses and brake shoes, etc. that are normally an essential part of the trucks can be placed upon the instant device in working fashion in exactly the same way as are already done in the existing Road Railer trucks. Thus, discussion of such detailed description is not required here.

So now we have a bogie that meets all existing specs because it uses existing trucks, can stand alone on the tracks, be placed between cars supporting both cars simultaneously and, should a flat wheel develop, itself be taken out of service so that the important capital investment, the railcars themselves--and their all-important freight or passengers, can remain in service much longer thus producing much higher gross revenue for the railroads with nearly the same capital outlay. The complete removal of one-half the trucks, produces the weight saving. This weight saving can then be turned into paying freight loads. Making the instant invention out of aerospace lightweight ultra-strong composite materials instead of the normal cast parts can also produce a large savings of dead weight. Many such aerospace materials function best in tension instead of compression and the instant invention is shown in a tension design as well as the typical compression used for cast parts.

FIG. 1 shows the basic invention having railcar support plate P mounted underneath the end of railcar R. Standard knuckle couplers K to releasably connect the railcars R into a train are also provided at the railcar R ends. The knuckle couplers K take up the required squeeze and longitudinal pull forces as they do presently. The instant invention does not affect the couplers. Couplers K may be the existing couplers on every existing railcar R, and need not be

removed or relocated to retrofit existing cars R into the present articulated configuration.

Fig. 1 shows how the instant invention can operate with a permanent connection W attached to the railcar on the right-hand side of the figure. This though need not be the ordinary method of operation.

The invention's mounting bracket M can be permanently attached to one end of a railcar R via exactly the same mounting device, here designated as Swivel W, as is presently used to mount trucks T directly to the bottoms of railcars R. And naturally, trucks T would be the very same railroad trucks as are presently mounted under railcars R. So therefore, the very same existing and paid-for capital accoutrements may remain on cars R, under certain conditions, and do NOT require redesign. The trucks T may require re-engineering or even complete re-design so to handle heavier loads as car R capacity is increased with the decrease in overall car R gross weight as trucks are removed from under the train's cars. The increase in car R payload capacity is coming as a direct result of the overall decrease in truck T weight. "Heavier loads" on each truck T arises from the decrease in overall numbers of trucks T in the train. This configuration would allow another car R to be attached without it needing trucks T, as seen on the left side of Fig. 1. Hence, the train is articulated with partial cars free of trucks and others having trucks permanently attached thereto.

Mounting bracket M is permanently attached to a rail truck set T. Trucks T themselves may also swivel to more easily round corners.

Mounting bracket M has bearing B, which supports the structure of the next railcar R in the train.

"Landing gear" L supports the end of railcar R not having mounting bracket M permanently attached to it. The right side of Fig. 1 shows, for example, how landing gear L moves up and away as mounting bracket M slides in to be attached. "Landing gear" L is described with that very name in issued U. S. Patent Nos. 4, 981,083 and 5, 685,228.

When the two railcars R are coupled together, the knuckle couplers K are locked together providing the link while the weight of the first car R is supported by the bearing B of mounting bracket M, all of which is supported by the trucks T of the articulating bogie formed by the fusion of mounting bracket M and trucks T. Bearing B is of the type sized to handle the load. The "type" may also be a bearing race full of multiple individual bearings but still designated here as B. Whether individual, lazy susan or other types of bearings or races is used, Plate P is permanently attached to the underside of Car R and is large, deep and wide enough to support B regardless of how the cars R independently move.

Note that plate P is preferably sloped ("upward") to allow bearing B to itself lift car R up slightly as it slides into working position on or under plate P. This slight lifting action allows landing gear L to clear the rails so that it may be retracted with minimum force.

Bearing B is adapted to enhance that action of lifting railcar R landing gear L off the rails. One bearing B is shown but more can be used [as well as multiple races]. See Fig. 6.

Note that in this extended mounting bracket configuration, the bogie is unstable and cannot lift only one car up at one time. Therefore, landing gear L would preferably raise plate P higher than the bearing B. And then when both railcars R are coupled together and the trainset completed, with all plates P hovering over their respective bearings B, all cars can be brought down upon their respective bearings B simultaneously [see Figs. 4 and 5].

FIG. 2 shows the articulating setup of Fig. 1 from the underside. The left landing gear L is in working position to support the weight of the left car R until bearing B makes contact with and supports plate P. The landing gear L on the right side of mounting bracket M is shown retracted upwards in stowage position as the right railcar R is fully supported by the articulating bogie formed by trucks T and mounting bracket M. The knuckle couplers K are preparing to clasp. Here the right car R is permanently supported by the invention through Swivel W.

Note that the wheels of truck T are shown as being placed "inside" of mounting bracket M in Fig. 2. For height considerations, M can be moved "downward" to straddle the trucks. Alternative schemes to provide lower clearance may be designed and used as needed. And should aerospace composite materials be used instead of the normal cast parts, with the lesser material required for aerospace composite structures, M can certainly be placed within the trucks and directly on top of or even within the area of the axles.

The placement of weight-bearing Bearings B is important to be located within the extent of axles A. Thus the car R weight will be bearing down between the axles A and the instant bogie will be stable not only as it rides the rails but also as it awaits a next adjoining car to be placed thereupon.

FIG. 3 shows railcar R with plate P and knuckle coupler K from the bottom. Airbrake air pressure hose H runs along under the car R with bleeds going to pneumatic actuators used to operate landing gear L. When a car is coupled and afterwards the brake line H is connected to the rest of the train, it will automatically raise the landing gear L. Upon uncoupling, when the brake line H is opened, landing gear L automatically drops into working position before the cars R are separated and bearing B moves away ceasing to support them.

Alternatively, line H can be Head End Power used to positively activate and deactivate landing gear L via standard electric motors and/or electric or computer controls.

FIG. 4 shows a side view of an over-the-road truck-type landing gear L that retracts directly into itself. Here it is in working position down on the rail.

FIG. 5 shows a side view of the car R of Fig. 4 being supported by bearing B on mounting bracket M and trucks T with its landing gear L raised straight up into itself. (Instead of the Figs. 1 & 2 sideways raising action.) Landing gear L does not now contact the rails.

FIG. 6 shows the under side of cars R with a mounting bracket M having more than one bearings (or race) B at either of its ends standing between the two cars ready to itself couple the cars together. Here there is no permanent

connection to any car. And the bracket M must be designed to handle all the forces. Thus, the instant invention can handle each car in a fully separable manner, be able to be moved around the railyard at will and be used to articulate any train that is being assembled there without needing a shop or its fixed equipment.

Attached to mounting bracket M on both sides is tongue couplers TG, half of a tongue and groove attachment device also described in the two patents previously listed hereinabove. Each railcar R has the corresponding groove G to accept the tongue couplers TG. Groove devices G can themselves be swivelable to allow the train to round corners. Bearings B move about plates P while supporting the weight of the railcars R through each one of plates P. Knuckle couplers K are clearly not needed in this configuration, or, may be used to handle most of the coupling stress while TG and G are simply used to maintain M and T in position between cars R.

B may also be ball or roller bearings of the type currently used in the wheels but mounted horizontally to support car R directly. Hose H on M is shown in a position capable of connecting the line between the two cars R. Vertically mounting an existing race is certainly possible, but not necessarily the best method for supporting the Support Plate P.

Unfortunately for the prior art landing gear, the tiny wheels will probably NOT support fully loaded cars R as they travel over the railyard hump. Thus, Fig. 7 shows the landing gear L fitted with removable and changeable Teflon pads TP. Pads TP can be designed to handle the weight of a fully loaded railcar R as it travels, slides, the short distance over the hump while moving towards one of the instant devices attached to the last car of the train to be coupled together. Pads TP are replaceable as they wear down and should not cost a significant amount. As seen, pads TP are flanged so to keep the car R on the tracks. Obviously, another fix is to use standard wheels thereupon.

Fig. 8 on the left-hand side, alternatively shows a single, swivelable groove G coupling device in the middle of the underside [within brackets] of car

R to make the car-to-car connection while giving more room inside car R for freight which knuckle coupler K would normally take up. Its side view, far left, showing G as mounted under R and clearing P is also provided in Fig. 8 to reestablish the presence of swivel W in mind.

This overall inventive arrangement allows the cars R to be attached and detached in any order in any yard without changing railyard operations except to couple and uncouple the instant stand-alone bogies.

The stand-alone articulating bogie shown in Fig. 8 standing between cars R comprises trucks T, mounting bracket M and bumpers U that are mounted on stands S that are used for keeping the bogie between cars as the train starts and stops while allowing the bogie to itself remain unconnected to either car while supporting the weight of both cars by the horizontal bearings B. And bearing B is of course mounted upon mounting bracket M which is carried by trucks T. Shown is two different schemes whereby the weight of cars R will remain between the axles A (Fig. 9) while the bumpers U maintain the bogie between cars R. On the right hand side of the bogie shown is seen a scheme useful when the support plate P is extended (Fig. 11, 12, 15 - 17) outward from the vertical sides of cars R. The bogie's left hand side shows that the car R will rest upon bearings B while bumpers U contact car R sides to maintain the articulating bogie between the two more standardly coupled cars.

Note that Stands S are shown to have a retractable feature -- as for instance around pivot PT -- to allow same to move out of the way when coupling or uncoupling cars R. It also allows them to be placed out of the way of wires and hoses which may be placed upon either side of car R. This retractability feature allows normal operations over the railyard hump while making sure that the bogie does not move out of place during the normal operations of the train enroute. For instance, if the hump is to the right, the right bumper and stand is up to stop the bogie as its bearing B contacts the car R's plate P. The other stand S can be retracted for clearance purposes or it too may be raised to await the incoming next car R from over the hump. Both stands S can be retracted for

clearance purposes as the bogie is moved around the railyard. Or pivot PT may be deemed unnecessary for normal railroad operations.

The right hand car R shown in Fig. 8 has the groove G portion of the tongue-and-groove coupling system of the prior art on the car in the position of the normal position of knuckle coupler K.

The couplers shown G and TG could also be knuckle couplers K. And they could be attached underneath the car R as shown in the leftmost car R of Fig. 8.

Plus, stands S can serve to couple a car having knuckle couplers K with one needing groove couplers G for the purposes of providing greater interior space inside that particular car. See Fig. 13. Here is a case where the stands S must be designed with the full coupling stresses and forces in mind.

Also, the retracted Stands S are useful in placing at the end of a train and fully under the last car R as the trailing bogie to support the end of the last car without needing to couple to another car. Stands S can also be used to couple the first articulated car R in a train to the engine [or to a standard-bogie car]. This allows the carrying of a spare to compensate for hot bearings and/or flat wheels and the type that otherwise may serve to require train stoppage and offloading of cars onto sidings.

Stands S is preferably movable into three positions on the bogie, middle (Fig. 11) and at either of the two ends (Figs. 12, 13, 14), so to keep the axles directly underneath the cars R when they are either behind the engine or at the end of the train. This provides stability and prevents the bogie from being upended by the weight of the last car R. Retractable supports (not shown but similar to Fig. 21) can also be provided to maintain a trapezoidal support for the weight of the last car. It would connect from the vertical car wall, or the coupler, of the last car to the stand S, or the last coupler mounted upon it, so to maintain the bogie in place under the last car even though there is no other car behind it. The retractable supports (not shown) may be designed to distribute the weight of the last car, or the articulated car if it couples one to a standard car or engine, across both bearings on the bogie. Placing weight on both bogie

Bearings B helps prevent excessive stress forces from building up on the bogie itself and shortening its own lifespan.

Existing bogies can be retrofitted with mounting brackets M and bearings B to retrofit existing non-articulated trainsets into lighter-in-weight and increased net carrying capacity articulated trainsets after the manner of this invention.

This invention represents the simplest manner to retrofit existing rolling stock. The simplest method is also the cheapest in cost to accomplish.

The articulated bogie set having tongue and groove couplers can do double duty to couple railcars R or over-the-road truck bodies (here would also be denoted as R) into a train. The use of existing Road Railer coupling schemes on the instant bogie can also be accomplished.

Turning to Fig. 9, we see the most compact embodiment of the instant design having bearings B, on Mounting Extensions ME separated from mounting bracket M via springs N and all supported on axles A. Bumpers U are mounted on stands S that are used for keeping the bogie between cars as the train starts and stops while allowing the bogie, or railcar articulating device, to remain unconnected to either railcar. [In that case, the cars would be coupled directly to each other.] Both coupled railcars would be supported by the horizontal bearing B. Dashpot D, or optional dampening, shock-absorbing mechanism can also be added.

Fig. 10 shows the device of Fig. 9 when the wheels of the trucks T are added to the axles A. It is seen, from this half-figure, that most of the device is hidden behind the size and extent of the wheels of trucks T.

By taking the wheels off T, we see that bearings B are placed within the extent of axles A so to maintain the Center of Gravity between the wheels of trucks T and between the axles. This can prevent the device from rising up off the rails on one side as the weight of a loaded railcar is placed upon the other side.

One can also see that in this design, the entire articulating device is made compact, efficient and uses a minimum of weighty materials.

Fig. 11 shows individually-articulated railcar R sitting on its landing gear L with a plate P extended beyond the car's R sides and ready to make contact with the bearing B of the articulating device so that its knuckle coupler K may connect with those placed upon the articulating device. Note that the plate P is, in this configuration, lower than the bearings B and that it will be the job of the engine to push the articulating bogie device under the plate P. Whether this is done via moving the device itself or moving the car R upon its landing gear L is unimportant so long as, in the latter situation, the invention is blocked (or chocked) and kept from running away from the car R.

It can also be seen that as plate P rises up into position, couplers K will also rise up to meet and properly connect. Plate P should be extended away from the car R sides only so far as necessary to make certain that couplers K are in alignment before they must couple. It should be noted that in this configuration, landing gear L automatically rises up off the rails and may not, depending upon whether it is safely far enough off the rails, need mechanisms to make it rise any further. In this configuration, landing gear L may actually be a non-moving extension of the railcar R undercarriage supporting structure. Thus, except in retrofitting, it need not be an add-on structure/mechanism.

Fig. 12 shows the car of Fig. 11 coupled to the instant invention via its knuckle couplers K. Couplers K are mounted upon the invention's stands S.

Fig. 12 shows an individually articulated railcar R connected to the articulating device with its support plate P fully supporting car R while the Stand S is in an off-center location. Stand S can be moved about the instant invention in its simplest configuration by bolting and re-bolting it via typical means in place in the railyard and it does not have to be taken to the shop for re-configuration.

Fig. 13 puts all the above together: Mounting Bracket M, Mounting Extension ME supporting Bearings B, Springs N separating M from ME, even a Dashpot D to dampen ME vibrations, and Trucks T showing only Axles A. All this is supporting horizontal Bearing B, which supports Railcars R via their Support Plates P. This setup makes possible the use of the properties of aerospace

lightweight materials as well as railcar articulation for best-possible train dead-weight attenuation. It is also a very efficient design itself using a minimum of materials and weight.

Fig. 13 shows the case where Split Stand S is "split" so to handle coupling two standard car R configurations or engine neither of which have room for the articulating device underneath either. The couplers may be both of the knuckle K type or the TG type as well as the mixed configuration shown. This allows the two standard cars R to simultaneously couple to the articulating device whenever necessary. Thus a "spare" device may be easily carried in train. A spare would be required to replace a device that may develop a hot bearing, flat wheel or the like. The damaged device may then be left on a siding while the full train and ALL the freight or passengers is carried on to destination.

The configuration of Fig. 13 may be necessary when an extra articulating device is carried directly behind the engine and connects it to a tank car -- or any such situation. The reason for an extra or "spare" articulating device to be carried in train is to handle as for instance the following situations in detail:

Hot box: if bearings overheat on the main line, presently an entire car and all its freight is dropped dead on a siding. The freight of the affected shipper can then be unintentionally put at risk. Contrarily, by using this new device and by articulating the cars R individually, the freight can move while only the device itself is dropped dead on a siding. If you drop one device off, the train must carry a spare to fit into place and support the affected individually articulated railcars R.

Interchange: if one railroad invests in this device while the freight it is carrying must go forward to its destination via another railroad that still uses standard cars R, the extra device would go along to connect the individually articulated railcars R from the first railroad to the standard cars of the second railroad. This situation can be known by the railroad's office before the first railroad's trainset is put together. Thus, sufficient extra devices can be put in

train in anticipation of transfer as well as hot boxes and other unexpected situations.

There will always be the case where there is no room for the wheels of the articulating device to fit under the standard car. This situation is true for tank cars, and of course, engines. Fig. 14 shows how Stand S may be moved to either side of the articulating device to allow it to still connect to any and all standard rolling stock.

Fig. 15 shows two individually articulated railcars R coupled at the Stands S-supported couplers K of the railcar articulating device. Stands S is here located in the middle of the instant articulating bogie device.

The plate P can also be deeper or thicker and given an initially connecting curve, Fig 16, to assure that the landing gear L rises up sufficiently without using any mechanism.

Fig. 17 shows an initially typical situation where the individually articulated railcar R meets a standard railcar R and must connect. The trucks T of the standard car R are normally placed well back of the ends of car R. So the articulating device's wheels also fit under the standard railcar R's frame and the two cars R may connect without even having the Stand S in place upon the articulating device. [Standard cars R do not have a Plate P, thus there is room for the bearing B to slide under without contacting the underside of the standard car R.]

Fig. 18 shows a minimum-material bogie loaded in tension around the axles. The tension suits the use of lightweight aerospace materials.

Fig. 19 is a schematic detail of the relationship of the bearing B to the railcar support plate P and the mounting bracket M. Fig. 19 is a schematic close-up showing a ball-Bearing B supporting Plate P from its working position in Mounting Bracket M. This is the basic structure that allows the invention to perform.

Fig. 20 shows an all-steel rail wheel having cooling fins O placed thereupon to allow for effective braking even if the axle A is made of lightweight aerospace composite materials and not able to dissipate the heat of braking.

Turning now to Fig. 21 which shows a standard Mounting Bracket M from which two angled Mounting Extensions ME rise up to Support Plate P which is here placed up on the sides of opposite cars. Fig. 21 is a view showing the angled Mounting Extensions ME which are shown crossing each other and supporting Plate P which itself is mounted underneath Vertical Plate Support V. The sidewall itself of the car R body is not shown. Mounting Extensions ME straddles knuckle couplers K.

Fig. 21 arises from the fact that there exists a body of thought that it is the sides of a car that actually support all the weight. In using this thinking, the sides can be built up to support B. The angled Mounting Extensions ME support the Plate P which itself is mounted underneath Vertical Plate Support V. Putting bearing B higher up along its' sides allows some of the car's R weight to be below the support point. This essentially lowers the center of gravity in relation to the support point. This car should be able to go around existing corners faster than standard cars or the fully underside supported articulated cars.

As seen in Fig. 21, Vertical Plate Support V is a part of the sides of car R and has support plate P, which in turn is supported by Bearing B mounted atop Mounting Extensions ME which is of course mounted upon Mounting Bracket M that as shown in Fig. 8 is mounted on trucks T. As always, the number of individual bearings or races B may be variable as designed. A laterally wider version of Vertical Plate Support V (not shown) can support more than one bearing B.

This crossing of Mounting Extensions ME is imitated by the Retractable supports (not shown) discussed in the description of Fig. 8. Those supports would distribute the weight across both bearings B and then cross over to couple with the last coupler if the bogie is itself the last bogie on the train, or with the coupler of the next car if the next car is of standard, non-articulated design.

Optional Flange F (not shown) is placed covering the ends of Plate P and Bearing B to prevent Bearings B from coming off Plate P and is also for limiting sideways movement of the combination. Flange F can also be used in all configurations to prevent excessive side motion of the cars R as they move around corners. This prevents passing trains from hitting. Also not shown is an optional cover plate that would be placed laterally over the Plate P - Bearings B combination that serves to limit movement fore and aft as forces are put upon the coupled cars R. Said optional parts could physically be nothing more than flat plates. That is why they are not necessary to be shown.

IN OPERATION, the instant device is compact, efficient and can be designed to handle differing weights of cars R. Even an extra wheel can be mounted between the normal two wheels of otherwise-standard trucks of the instant articulating bogie to add structural support for heavier loads without re-designing the wheels themselves. Shippers can rent or own a set of articulating trucks instead of investing in a whole railcar. An end bumper on the shipper's siding can be reconstructed to act as the device does. The landing gear carried along on each individually-articulated car will always be available on any shipper's property and on any railroad. The individual cars the instant invention articulates can fit well into standard trains and one railroad's individually articulated railcars can be successfully transferred to any other.

The instant articulating bogie itself, by remaining unattached to any railcar in any part of a train simplifies the yard operation to its most basic:

In the railyard, wheelless railroad cars can be articulated as herein proposed by those responsible for manifesting the train. They can then be loaded with freight [or passengers] and sent over the hump to form the freight train. Passenger train cars will then be connected to the engine.

In the railyard, wheelless railroad freight cars can be loaded with freight and then individually sent over the hump to connect to the train being formed. The cars can be sent over the hump on "landing gear" to be stopped by the

bumpers of the instant invention which itself is individually sent over the hump to take position between the cars being articulated in the yard.

Cars having one side with an instant articulation device permanently attached thereto can be sent over the hump to have their wheelless other side {poised on landing gear} to be supported by the articulating device of the car already previously sent over the hump just before.

The instant articulation device can be sent over the hump by itself to connect to the engine or other railcars before any car in need of the device is sent over the hump. This allows the train to mix articulated and non-articulated cars in the same train. This also allows articulated cars to be transferred from one railroad having articulated cars to another railroad that may not have articulated cars. It also allows trains to be mixed and matched in the yard as to the type of cars it will carry. These spares are a necessary adjunct to any train.

The instant device may have to carry couplers upon itself, much as the present-day Road Railers do, for those times it may have to connect to others of itself as spares or to connect to standard cars or engines having no room for the device to slip under their exterior undersides.

The device stands can be bolted and re-bolted in differing positions on the device as necessary to handle differing coupling configurations.

Although the preferred embodiment is disclosed, other embodiments that maintain the Spirit of the Invention may be conceived that I also seek to protect by these Letters Patent, therefor

I CLAIM: